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APPENDIX J: Potential Social Impacts of Nutrient Load Caps on POTWs

The purpose of this appendix is to provide the results of deliberations by the Chesapeake Bay Program's multi stakeholder UAA Workgroup on the issue of potential social impacts of nutrient load caps on POTWs. The assimilation of information contained in this appendix includes the following:

- Part I: Draft letter from Richard Eskin, UAA Workgroup Chair, Maryland Department of the Environment, to Clyde Wilbur, Greeley and Hansen LLC.

- Part II: Letter from Clyde Wilbur, Greeley and Hansen LLC, to Allison Wiedeman, EPA Chesapeake Bay Program, dated September 21, 2002.

- Part III: Information generated by the UAA Workgroup during its deliberations on this issue.

1. PART I

Mr. Clyde Wilber
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Dear Mr. Wilber:

Thank you for your comments to the Use Attainability Workgroup through Ms. Allison Wiedeman regarding social impacts related to load caps that should be addressed in the Use Attainability Analysis (UAA). After extensive discussion with Chesapeake Bay Program and EPA headquarters staff, and discussions in the UAA workgroup, I respond below, on behalf of the workgroup.

A fundamental assertion in your letter is that POTW load caps will directly and unavoidably result in rural development. Implicit in this assertion is that there will be no response from government or communities to balance such tendencies, that caps will be more important than all of the other factors currently driving rural development, and that the only response to nutrient caps is to stop development in certain areas when there are alternatives such as more stringent treatment, more extensive application of best management practices, water conservation, and, reductions in air deposition that allow for stable total loads with an increased population. As a last resort, if a community determines that more damage would occur if current uses need to be met, the regulations provide a safety valve for revising local designated uses. For all of these reasons, detailed below in response to your specific comments, the UAA workgroup does not believe at this time that a more detailed response is necessary in the Baywide UAA. However, these issues are all subject to discussion and the individual States may wish to pose these issues in the UAA that will be submitted in support State water quality revisions.

We should all be aware that nutrient load caps are already being imposed for some municipalities as part of local TMDL implementation, so that it is incorrect to ascertain that the Bay water quality standards will be solely responsible for imposing caps, should caps be a selected means of compliance.

But should load caps be the avenue selected by the states, such restrictions on POTWs are nothing new in that some NPDES permits currently require load limits on some facilities for other parameters such as BOD, TSS, pH, Total Phosphorus, ammonia, DO, Total Chlorine, toxic parameters and fecal coliforms. Many of these parameters are being regulated at very low levels and the need for growing populations to move outside of the service areas has not surfaced as an issue to date for these limitations.

Below are responses to specific comments in your letter:

1. It is imperative that the UAA acknowledge and state clearly that POTW nutrient caps will eventually force new development away from urban areas and into areas that are now predominantly forested and agricultural.

There are numerous ways by which new development may respond that does not force that development into forested or agricultural land. Regional growth data indicate that development during the past decades has already affected forested and agricultural areas, even though there were no nutrient caps in place. Table 2 in the attached paper (Beck and Kolankiewicz, 2001) shows how the urbanized areas in the watershed have grown much more rapidly than their populations (e.g., 3–5 times faster). Furthermore, The Chesapeake Bay Programs Watershed Model estimated that between 1985–97, 413,000 acres of urban/suburban land and simultaneously decreased forest, wetland, and agricultural lands by 422,000 acres. Sprawl development already exists and there is no evidence that POTW nutrient caps will significantly exacerbate this trend in the future. Furthermore, most POTWs have in place a facility plan which accounts for extending service to outlying areas which are currently undeveloped and/or served by onsite systems. Lastly, as evidenced by the drought in 2001 and corresponding load reductions to the Bay, municipalities could gain treatment capacity by aggressively eliminating extraneous sources of flow (i.e., inflow and infiltration).

Therefore, this is a baseline issue. No analysis has been performed to show that growth in forested and agricultural areas will increase *above and beyond* current rates as a result of POTW nutrient caps, or compared to the baseline applicable to the UAA (i.e., the POTW nutrient caps or other pollutant load allocations that would be required to meet current State standards). Additionally, it is important to remember that all lands, inside as well as outside a given POTW service area, will be under a load allocation. The states will need to determine how all sources can maintain a load allocation, not just for point sources.

In fact, nutrient caps or any type of pollutant load allocation will not cause or contribute to urban sprawl beyond what is currently occurring since growth along highways and in rural country sides will happen anyway, absent developing and implementing environmentally sound comprehensive land use plans. Causes of urban sprawl are complex and include:

1) Individual choices—people want to live in low-density, larger single-family homes away from over crowded and polluted urban centers.
2) Market forces—development will occur in areas where it is least controlled and less expensive to develop.
3) Government policies and subsidies—lack of zoning policies to prevent sprawl; subsidies for infrastructure (new roads, highways, bridges, schools, etc.), housing and automobile use.
4) Decentralization of employment—lower land and development costs, tax breaks to employers who develop outside urban centers.

In short, allowing environmental policies that increase nutrient loads or other pollutant loads to the Chesapeake Bay will not stop or slow down urban sprawl they will just pollute the bay and encourage urban sprawl away from the Chesapeake Bay area.

2. Growth and development can occur without POTWs.

Yes, and due to the development of new onsite treatment technologies, people can now build in areas where the soil previously would not support a septic system/drainfield or housing clusters can share a centralized on-site system.[1] These technologies are being utilized to take advantage of these new housing construction opportunities with minimal increases in nutrient loads. There is no evidence that allowing POTW nutrient loadings to increase without limitation will curb or stop growth in these areas.

3. There always will be political jurisdictions in the Bay watershed that will welcome growth displaced from localities with capped POTWs or from other jurisdictions that do not want growth.

Again, this is a baseline issue. Even without nutrient caps, current trends indicate that growth already occurs in areas, without a sanitary sewer system. Innovations in on-site treatment systems and adequate transportation infrastructure will likely affect this trend. Disincentives to inappropriate growth patterns, such as those included in the concept of Smart Growth (e.g., restricting public funding for infrastructure fueling such growth), can lower the rate of sprawl development.

Growth occurs in places with the economic and social infrastructure that attract new residents. As stated in Item #1, there are many determinants of where sprawl growth occurs: communities may subsidize services for new residents or provide tax incentives to encourage new businesses to move in; states and the federal government subsidize schools, road building, which encourages movement away from central cities; and income tax laws favor home ownership over renting. Existing urban areas have a competitive advantage over rural areas in that they have many more employment opportunities and provide many more goods and services than rural areas; at the same time, the disamenities of living in densely populated central cities (congestion, air pollution, noise pollution) have the opposite effect. Again, the issue is how to best accommodate growth without harming environmental quality. This requires comprehensive land use planning.

4. As the water quality of the Bay improves, it follows that more people will want to live near the Bay and use it.

It is the limitation of nutrient and sediment loadings (e.g., from POTWs) that will allow Bay water quality to improve—without these reductions it won't. Therefore, growth induced by environmental improvement cannot be used as a justification for not imposing limits on the nutrient loading; if the loads are not limited, water quality wont improve and the induced growth will not occur. This is indeed, a very good example of how State and local planning can make a big difference. In Maryland, the Critical Areas Act, recently extended to the Coastal Bays, limits the extent to which this "negative feedback" will occur.

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[1] For example, see Decentralized Wastewater Treatment on the Increase, *U.S. Water News*, September, 2002.

5. Even in Maryland, growth and development has not stopped in response to smart growth initiatives, nor is smart growth intended to stop growth.

Precisely—growth that is sensitive to the need to protect the surrounding environment need not limit growth entirely. In fact, comprehensive land use planning and smart-growth solutions are effective tools for slowing sprawling growth regardless of its cause.

6. The UAA must explain and address the pollutant loads and non-water quality environmental impacts (air pollution, wildlife habitat losses, noise, energy consumption, etc.) associated with the development of forested and agricultural lands caused by POTW nutrient caps.

Again, this is a baseline issue. People are already choosing to live in outskirt communities for various reasons, none of which are related to the imposition of nutrient caps (since none are currently imposed). Any change in growth patterns prompted by future nutrient caps is unlikely to have a substantial impact on the environment in rural areas *over and above* what would occur anyway.

Moreover, compared to the baseline applicable to the UAA (e.g., the POTW nutrient caps that would be required to meet current State standards), the reductions contemplated in the tier scenarios for anticipated 2010 conditions represent an increase in allowable nutrient loadings (otherwise, there would be no need to do a UAA to change the standards—the tiers would just represent a TMDL to meet the standards).

7. The Bay Program has acknowledged that non-point source controls are less effective than point source controls.

The Bay Programs water quality model shows that protecting the Bay will require all point and nonpoint sources in the watershed to implement measures to reduce nutrient and sediment loadings. Nonpoint source controls can be very cost-effective (and some agricultural controls have the potential to increase production—e.g., cover crops, which add nutrients to the soil, potentially increasing overall output) or reduce production costs (e.g., nutrient management planning, which can avoid the cost of adding excess nutrients). Voluntary programs are potentially less effective only because of the difficulty in ensuring implementation and measuring effectiveness.

8. The concept called the optimal level of development does not work for the Bay watershed as a whole because of its inability to account for the political forces affecting land use in the multitude of local and state jurisdictions throughout the Bay watershed.

All jurisdictions in the Bay watershed will need to reduce nutrient loads to the Bay from both point and nonpoint sources. The fact that development patterns will (and can) differ throughout the watershed does not invalidate the concept of optimal level of development. It just means that some places are closer to their carrying capacity than others by virtue of past development and efforts (or lack thereof) to maximize economic and social development within that capacity.

9. Escalating land prices are just as likely, if not more likely, to lead to ever increasing development density rather than less development in rural areas and greater environmental impact.

Again, this is a baseline issue. No analysis has been performed to suggest that land prices will be lower (or higher) under the baseline applicable to the UAA (i.e., controls that would be necessary to meet current State standards) compared to implementation of the tier scenarios. Also, no analysis has been performed to show that current trends in development density and rural growth will differ under the baseline (i.e., controls that would be necessary to meet current State standards) compared to implementation of the tier scenarios.

As populations in the watershed increase, the issue is how to accommodate the growth while minimizing impact on environmental quality. The tier scenarios include a range of controls for doing this, including effluent limitations for POTWs, urban growth reduction targets, environmentally sensitive design, and others.

10. Growth outside of a POTW service area is certain to have greater environmental impact than growth within it.

This is an unsupported statement. Development within current POTW service areas can be as destructive as suburban or rural development if done improperly (e.g., exacerbating urban runoff, adding to urban congestion and air and noise pollution). Development in all places needs to proceed with minimal environmental impacts regardless of whether POTWs have nutrient caps.

11. The amount of this differential impact is quantifiable and should be presented in the UAA documentation.

This statement assumes that load caps will directly be the cause of incremental sprawl. But, as previously explained in this response, there is no evidence that that will be the case. Reasons for sprawl are varied and complex, with the overriding factor being the populations desire for privacy on a larger size lot. Other factors (including: individual preference, market forces, and government policies) will be more influential overall in determining development pasterns than load caps at POTWs. Because it is not believed that there would be a direct correlation—between growth outside of a POTW service area and load caps—we do not recommend proceeding with estimating environmental impacts that would result from such growth in this collective UAA analysis. However, once individual states have determined how to maintain the load allocations within their basins in their jurisdictions, the may choose to evaluate this potential.

12. The UAA should avoid subjective analyses leading to personal judgments. (See statement reading The new optimal level of development avoids the damages... caused by excess development and growth.)

The statements in the paper cited are consistent with accepted economic theory. If externalities such as the environmental impacts of development (e.g., air and water pollution, changes in land

use) are not internalized in development decisions, then the level of development will not be optimal; the market will provide excessive amounts of growth and development.

Public policy serves to internalize such externalities through a variety of mechanisms to help achieve the optimal level of development. The growth of concepts and methods targeted at achieving economic growth without the degree of environmental destruction evident in the past indicates that policy makers are moving in the direction of internalizing environmental costs of development.

13. A UAA is a scientific analysis and as such personal views and judgments on these subjects are irrelevant because ultimately growth and development displaced by POTW nutrient caps will be governed by local and state political forces rather than the personal judgments attributable to those of us involved in the preparation of the UAA.

It is a personal judgment to assume that nutrient caps will significantly displace growth and development, when there are so many other factors that clearly control sprawl development in the current absence of such caps. Local and State political forces will indeed be among the governing factors, and how these governments respond to the need to correct water quality impairments, rather than the caps themselves will be critical. More stringent treatment, new development within urban areas and re-development with low-impact development techniques, requirements for urban nutrient planning, and requirements for on-site treatment in rural areas can all direct future development to appropriate areas.

14. The UAA should not take the position that growth in and of itself is good or bad, rather it should bring to light the growth impacts brought about by regulatory action—in this case, as it specifically relates to POTW caps.

The UAA does not take any position with respect to growth. The applicable baseline for the UAA is the nutrient and sediment reductions necessary to meet current State standards. In comparison to this baseline, the tier scenarios attempt to incorporate feasible practices for accommodating growth in the watershed while minimizing environmental impact. The tier scenarios do not achieve current State standards; the nutrient caps under the baseline would be more stringent than under the tiers. Therefore, growth would be more limited without regulatory action to complete a UAA and change current standards.

15. Any control scenario that calls for POTW nutrient caps will have substantial and widespread economic and social impacts.

EPA has guidance for evaluating the potential for substantial and widespread economic and social impacts (U.S. EPA, 1995)—it is not sufficient to merely assume that a control scenario will cause these impacts. Many of the communities in the watershed have relatively high per-household incomes and can readily absorb the cost increases associated with the tier scenarios.

16. Caps will displace growth from urban areas served by POTWs to rural areas with lesser environmental controls. Such a displacement will have social and economic impacts changing how and where people live.

Again, growth is already occurring in predominantly agricultural and forested areas, without any nutrient caps currently in place. No analysis has been performed to show that this trend would be greater under the tier scenarios than without. See Item #1 for factors that cause urban sprawl.

EPA has guidance for evaluating the potential for substantial and widespread economic and social impacts (U.S. EPA, 1995)—it is not sufficient to merely assume that a control scenario will cause these impacts. Many of the communities in the watershed have relatively high per-household incomes and can readily absorb the cost increases associated with the tier scenarios. Further, there is no reason to assume that rural areas will continue to have "lesser environmental controls." That situation is currently changing with strong programs for farmland preservation and rural legacy programs. State and nonprofit purchases of land or development rights, and concerns over air pollution and environmental damage from new roads all may slow the tendency toward rural development.

17. This displacement will occur on a substantial and widespread basis when imposed Bay wide.

EPA has guidance for evaluating the potential for substantial and widespread economic and social impacts (U.S. EPA, 1995)—it is not sufficient to merely assume that a control scenario will cause these impacts or that the impacts would be unsupportable given the great public concern about protecting water quality in general and the Bay in particular. Many of the communities in the watershed have relatively high per-household incomes and can readily absorb the cost increases associated with the tier scenarios.

18. We offered a number of societal and demographic impacts for evaluation: displacement of families, the increase in the cost of housing, aging of the urban population, shifts in the social needs of the population and taxes.

Any analysis of social and economic impacts will follow EPA (1995) guidance. There is no evidence that the tier scenarios will cause the urban population to age more or less rapidly than they would under the applicable baseline (i.e., controls necessary to meet current State standards). There is also no analysis to suggest that housing prices will be higher or location decisions (family displacement) will be substantially different under the tier scenarios than under the applicable baseline.

In implementing EPA guidance, a UAA considers factors such as the impact of control costs on household fees and incomes. Many of the communities in the watershed have relatively high per-household incomes and can readily absorb the cost increases associated with the tier scenarios. Nonetheless, growth is already occurring outside urban areas in the watershed, and no nutrient caps are in place.

19. The UAA should focus not on whether such impacts will in fact occur, but on the nature and extent of those impacts that can be identified, assessed, and quantified on a large scale across the entire Bay watershed.

EPA has guidance for evaluating the potential for substantial and widespread economic and social impacts (U.S. EPA, 1995)— it is not sufficient to merely assume that a control scenario will cause these impacts. Many of the communities in the watershed have relatively high per-household incomes and can readily absorb the cost increases associated with the tier scenarios. The focus of a UAA is properly on whether there will be substantial financial impacts, and whether the resulting social and economic impacts will be widespread.

20. Although it is difficult to predict when and where this growth in agricultural and forested areas will occur, it is possible to predict the displaced populations (using growth projections and population that can be served by capped POTWs) and generally predict the associated pollutant loads and nonwater quality environmental impacts.

As noted above, households are already opting to locate in areas without a central sewer in the absence of nutrient caps. Therefore, it would be analytically incorrect to estimate the displaced population as the difference between maximum service populations at different nutrient caps. No analysis has been performed to suggest that location decisions (family displacement) will be substantially different under the tier scenarios than under the applicable baseline.

21. A scientifically-based analysis of POTW caps will show that load caps cause more environmental damage than the benefits derived from caps—this will require setting water quality standards that are achievable without POTW caps.

This is an unsupported statement. No analysis has been performed to suggest that location decisions will be substantially different under the tier scenarios than under the applicable baseline (i.e., the controls necessary to achieve current State standards).

Moreover, compared to the baseline applicable to the UAA (e.g., the POTW nutrient caps that would be required to meet current State standards), the reductions contemplated in the tier scenarios for anticipated 2010 conditions likely represent an increase in allowable nutrient loads.

Sincerely,

Richard Eskin, Chair
Use Attainability Analysis Workgroup
Chesapeake Bay Program
Maryland Department of the Environment

cc: Use Attainability Analysis Workgroup members

Attachment to Eskin Letter

Population Growth and Sprawl in the Chesapeake Bay Watershed

Does a growing population contribute to urban sprawl? The relationship between population growth and sprawl appears obvious to some but is denied or minimized by just as many. What has been lacking is a systematic, comprehensive, consistent means of quantifying the role of population growth in sprawl in recent decades. A national study by NumbersUSA, "Weighing Sprawl Factors in Large U.S. Cities" does just that.

Dozens of factors contribute to sprawl, from federal highway subsidies to the pursuit of more affordable housing and better public schools. All but one of these, population growth, have the net effect of increasing the amount of land consumption per resident, that is, of decreasing density.

The amount of land taken up by a city, town, or any urbanized area is the simple product of the number of residents times the amount of land consumed per resident, as shown in the following equation:

$$A = P \times a$$

Where: A = Area of urbanized/developed land in acres or square miles
P = Population of the urban/suburban area
a = urbanized land per person (i.e. the inverse of density, which is number of people per unit area of land)

One means of measuring the amount of sprawl then is the increase in 'A' over time. Fortunately, it is easy to measure the amount of overall sprawl because of a painstaking process conducted by the U.S. Bureau of the Census for a half-century.

Weighing Sprawl Factors in Large U.S. Cities and the figures below rely solely on Census data on Urbanized Areas of the United States to measure Overall Sprawl. The Census Bureau uses a rather complicated but consistent set of conditions to measure the spread of cities into surrounding rural land. The Bureau calls the contiguous developed land of the central city and its suburbs an "Urbanized Area."

The relationship between population growth and sprawl can be quantified by comparing rates of change in population and urbanized land area over the same period of time. The table on the next page makes this comparison for nine urbanized areas the Census Bureau has identified in the Chesapeake Bay Watershed Area. Population growth and increased per capita land consumption have played almost equal roles in the loss of some 1200 square miles of rural land in the Chesapeake Bay Watershed Area. According to U.S. Bureau of the Census data, increased per capita land consumption was associated with about 55% of the sprawl in the Watershed and

population growth was associated with about 45% of the sprawl, although there is great variation among the different Urbanized Areas of the Chesapeake Bay Watershed.

The Chesapeake Bay Watershed is home to more than 3,000 species of plants and animals, and nearly 15 million people today. The restoration and long-term protection of the Bay depends on halting the urban sprawl that is threatening the biodiversity and water quality of the area.

Chesapeake Bay Watershed Urbanized Areas – Table 1

Urbanized Area	Sprawl in Square Miles		% of Total Sprawl related to POPULATION GROWTH	% of Total Sprawl related to GROWTH IN PER CAPITA LAND CONSUMPTION
	1970-1990	1980-1990		
Baltimore, MD	282.9		28%	72%
Hagerstown, MD-PA-WV			47%	53%
Harrisburg, PA	71.4	4.8	30%	70%
Lynchburg, VA	65.7		32%	68%
Norfolk-Virginia Beach, VA[1]	221.4		85%	15%
Petersburg, VA	24.4		6%	94%
Richmond, VA	158.1		47%	53%
Scranton-Wilkes-Bane, PA[2]	20.4		0%	100%
Washington, DC-MD-VA[3]	450.1		47%	53%
TOTALS	**1,299.2**		**45%**	**55%**

Data sources: 1970 Census of Population, Volume 1 – Characteristics of the Population, Part 1 – United States Summary, Table 20 – Population and Land Area of Urbanized Areas, 1970 and 1960 (issued June, 1973); 1980 Census of Population, Number of Inhabitants, United States Summary, Table 34 – Population, Land Area, and Population Density of Urbanized Areas: 1980; 1990 Census of Population and Housing, Summary Population and Housing Characteristics, United States, Table 8 – Land Area and Population Density: 1990.

[1] Includes Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach.
[2] Prior to 1980, Scranton and Wilkes-Barre were separate Urbanized Areas.
[3] Includes District of Columbia, Maryland and Virginia suburbs, and Arlington CDP (Census Designated Place).

Note: In the Scranton- Wilkes-Barre Urbanized Area, the actual percentages for shares to Population Growth and Growth in Per Capita Land Consumption were –89% and 189%, respectively.

Chesapeake Bay Watershed Urbanized Areas – Table 2

Urbanized Area	% Growth in Land Area		% Growth in Population	
	1970-1990	1980-1990	1970-1990	1980-1990
Baltimore, MD	91%		20%	
Hagerstown, MD-PA-WV		13%		6%
Harrisburg, PA	91%		22%	
Lynchburg, VA	177%		39%	
Norfolk-Virginia Beach, VA[1]	50%		41%	
Petersburg, VA	58%		3%	
Richmond, VA	109%		42%	
Scranton-Wilkes-Bane, PA[2]	11%		–9%	
Washington, DC-MD-VA[3]	91%		36%	

[1] Includes Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach.
[2] Prior to 1980, Scranton and Wilkes-Barre were separate Urbanized Areas.
[3] Includes District of Columbia, Maryland and Virginia suburbs, and Arlington CDP (Census Designated Place).

Chesapeake Bay Watershed Urbanized Areas – Table 3

1970-1990 Chesapeake Bay Urbanized Areas Raw Data
Population, per capita land use and total land area
from 1970 and 1990 U.S. Census Bureau reports

Urbanized Area	1970 Population	1990 Population	1970 Per Capita Land Use (acres/person)	1990 Per Capita Land Use (acres/person)	1970 Total Land Area (sq. miles)	1990 Total Land Area (sq. miles)
Baltimore	1,579,781	1,889,873	0.1254	0.2006	309.6	592.5
Harrisburg	240,751	292,904	0.2084	0.3273	78.4	149.8
Lynchburg	70,842	98,138	0.3361	0.6711	37.2	102.9
Norfolk – Virginia Beach	936,522	1,323,098	0.3023	0.3210	442.3	663.7
Richmond	416,563	589,980	0.2222	0.3284	144.6	302.7
Scranton – Wilkes-Barre	427,035	388,225	0.2711	0.3318	180.9	201.3
Washington, DC/MD/VA	2,481,489	3,363,031	0.1275	0.1797	494.5	944.6

1980-1990 Chesapeake Bay Urbanized Areas Raw Data
Population, per capita land use and total land area
from 1980 and 1990 U.S. Census Bureau reports

Urbanized Area	1980 Population	1990 Population	1980 Per Capita Land Use (acres/person)	1990 Per Capita Land Use (acres/person)	1980 Total Land Area (sq. miles)	1990 Total Land Area (sq. miles)
Hagerstown	66,277	70,206	0.3573	0.3811	37.0	41.8

Sources same as in other tables.

Reference: Roy Beck and Leon Kolankiewicz, NumbersUSA Education and Research Foundation, 2001, www.SprawlCity.org.

2. PART II

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September 21, 2002

Ms. Allison Wiedeman
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Subject: UAA Social Impacts: Growth and Development Considerations

Dear Ms. Wiedeman:

On behalf of VAMWA and MAMWA, I want to thank you for the opportunity to comment on the paper entitled "Social Impacts: Growth and Development Considerations – Discussion Notes for UAA Workgroup (9/3/02)." This paper includes four attachments discussing the growth-related impacts of imposing nutrient caps on POTWs.

As you know, nutrient caps is a critical issue for municipalities throughout the Bay, and for that reason we have been encouraging the UAA Workgroup to explore and address this issue. The 9/3/02 paper is a first attempt at addressing the issues raised in March 2002. While we appreciate the efforts of those who contributed to the 9/3/02 paper, we believe the focus of the analysis needs to be re-directed. We wish to take this opportunity to discuss our concerns with the direction of the analysis in the 9/3/02 Paper and then outline a proposed approach to the growth and development issue.

Our Concerns With the 9/03/02 Paper

We have the following concerns with the current approach to addressing growth impacts as reflected in the 9/3/02.

1. It is imperative that the UAA acknowledge and state clearly that POTW nutrient caps will eventually force new development away from urban areas and into areas that are now predominantly forested and agricultural. (See, e.g., 9/3/02 Paper at page 1. "It has been suggested that nutrient caps for municipal wastewater treatment facilities could alter or displace growth and development." In an academic setting we could debate the timing, extent and locations of this displaced growth, but in the context of the UAA, the reality is that POTW nutrient caps will alter or displace growth in the Bay watershed for the following three fundamental reasons:

- Growth and development can occur without POTWs
- There always will be political jurisdictions in the Bay watershed that will welcome growth displaced from localities with capped POTWs or from other jurisdictions that do not want growth.
- As the water quality of the Bay improves, it follows that more people will want to live near the Bay and use it.

Unless each of the participating states are prepared to take away local land use planning decisions from local government and severely restrict growth as a matter of statewide policy, the inescapable conclusion is that POTW caps will displace growth to forested and agricultural areas. Notably, even in Maryland, growth and development has not stopped in response to smart growth initiatives, nor is smart growth intended to stop growth.

2. The UAA must explain and address the pollutant loads and non-water quality environmental impacts (air pollution, wildlife habitat losses, noise, energy consumption, etc.) associated with the development of forested and agricultural lands caused by POTW nutrient caps. Again, these impacts are beyond federal regulation and control because they flow from non-point source activities authorized by local political jurisdictions. The Bay Program has acknowledged that non-point source controls are less effective than point source controls.

3. The 9/3/02 Paper advances a concept called the "optimal level of development." This concept assumes that development will be driven largely by the cost of a fixed supply of marketable land as a commodity. While this concept may have some limited utility when applied to single economic sectors that are subsets of single jurisdictions, (where an isolated housing market is economically comparable and acts as a commodity), it simply will not work for the Bay watershed as a whole. The principal problem with this concept is its inability to account for the political forces affecting land use in the multitude of local and state jurisdictions throughout the Bay watershed. For example, faced with development pressure on rural land occasioned by POTW growth caps, some jurisdictions may well enact measures to restrict growth for environmental or other political reasons, while others will simply open their doors to growth utilizing on-site systems in the interest of economic development. We have seen these forces at work in the Washington Metropolitan Area over the life of the evolving Bay Agreement. Contrary to the analysis presented, escalating land prices are just as likely, if not more likely, to lead to ever increasing development density rather than less development in rural areas and greater environmental impact. While this development may have to occur outside of the Clean Water Act's National Pollutant Discharge Elimination Program it will, nevertheless, occur. In addition, growth outside of a POTW service area is certain to have greater environmental impact than growth within it. The amount of this differential impact is quantifiable and should be presented in the UAA documentation.

4. While it is difficult for any of us to restrain our point of view in these endeavors, we need to take care to avoid subjective analyses leading to personal judgments. (See, e.g., 9/3/02 Paper, Attachment 1 at page 5. "The new optimal level of development avoids the damages . . . caused by excess development and growth." It should also be noted that there could be adverse welfare impacts associated with projected growth and development that have not been addressed."). A UAA is a scientific analysis and as such personal views and judgments are out of place. Further, our personal feelings and views on these subjects are irrelevant because ultimately growth and development displaced by POTW nutrient caps will be governed by local and state political forces rather than the personal judgments attributable to those of us involved in the preparation of the UAA.

5. The UAA should not take the position that growth in and of itself is good or bad. Rather, it should bring to light the growth impacts brought about by regulatory action. In this case, as it specifically relates to POTW caps.

Suggested Approach to Growth and Development Issue

When we first raised this issue at the beginning of the year, we offered a number of societal and demographic impacts for evaluation. These included the displacement of families, the increase in cost of housing, aging of the urban population, shifts in the social needs of the population and taxes. While we continue to believe that these impacts are important, we have concluded that they are not capable of being objectively quantified on a geographic scale as large as the entire Chesapeake Bay watershed. We believe that the societal analysis should instead focus on the environmental impacts of POTW nutrient caps, which, as explained below, can be identified, assessed, and quantified.

The UAA is proceeding under 40 C.F.R. § 131.10(g)(6), which provides for changes in designated uses where the controls required to meet current designated uses would result in substantial and widespread economic and social impact. By its very nature, any control scenario that calls for POTW nutrient caps will have substantial and widespread economic and social impacts as follows:

- Caps will displace growth from urban areas served by POTWs to rural areas with lesser environmental controls.

- Such a displacement will have social and economic impacts changing how and where people will live.

- This displacement will occur on a substantial and widespread basis when imposed Bay wide.

We suggest that the UAA should focus not on whether such impacts will, in fact, occur, but on the nature and extent of those impacts that can be identified, assessed, and quantified on a large scale across the entire Bay watershed.

From the standpoint of societal impacts affecting the environment, the starting point in this analysis is an acknowledgement that POTW nutrient caps will eventually force new development away from urban areas and into areas that are now predominantly forested and agricultural. Although it is

difficult to project when and where this growth will occur, we believe it is possible to generally predict the associated pollutant loads and non-water quality environmental impacts.

Population growth projections in the Bay watershed together with the population that can be served by the capped POTWs can be used to estimate the population that will be displaced by POTW nutrient caps over a given period of time. Existing data and models can then be used to project the pollutant loads and non-water quality environmental impacts from this displaced growth. These loads and impacts together with the loads and impacts from the capped POTWs can then be compared to the loads and impacts from one or more scenarios combining pollutant loads and non-water quality environmental impacts from non-point sources and POTWs without nutrient caps to assess whether POTW nutrient caps will have more or less societal benefits (measured in terms of environmental impact) than alternative scenarios that do not call for caps.

While this approach focuses on only the environmental impacts of a growth cap and does not quantify all the societal issues, we believe it will go a long way toward helping the decision -makers understand the impacts of caps. To the extent the larger societal impacts of POTW nutrient caps across the Bay watershed that are beyond these quantifiable environmental impacts are included in the analyses, great care is needed to avoid a subjective approach laced with a personal point of view or agenda. Due to the difficulty of addressing these impacts, we suggest that the analysis focus on the quantifiable environmental impacts. With respect to the larger societal issues it may only be possible to compile a list of potential changes.

We recognize that ultimately, it will be necessary for the Bay Program to establish load limits to achieve the proposed water quality standards. These load limits need to be applied to the combined total of point and non-point sources. We suggest, however, that the water quality standards should be achievable using the six criteria of the UAA process while being ever mindful of avoiding actions that cause more environmental damage than benefit. We believe that a scientifically based analysis of POTW caps under this UAA will show that load caps cause more environmental damage than the benefits derived from caps. This will require setting water quality standards that are achievable without POTW caps. We would like to explore with you how this can be accomplished.

Chris Pomeroy, Dave Evans and I would appreciate the opportunity to discuss these comments with you in greater detail at your earliest convenience either in person or by phone. I will call shortly to set a date and time when we can talk. In the meantime, please call if you have any questions.

Yours very truly,

Greeley and Hansen LLC

Clyde Wilber
Principal

2. SOCIAL IMPACTS: GROWTH AND DEVELOPMENT CONSIDERATIONS DISCUSSION NOTES FOR UAA WORKGROUP (9/3/02)

It has been suggested that nutrient caps for municipal wastewater treatment facilities could alter or displace growth and development and that this could result in impacts that have not been considered in the current (as of August, 2002) cost and economic impact models by the Chesapeake Bay UAA workgroup. This document summarizes information and memoranda that have been generated as a result of this issue.

A description of this issue, as originally proposed, is provided in Attachment 4.

Discussion about the welfare implications associated with this issue is presented in a memorandum (6/25/02) in Attachment 1. Comments on this memorandum (see Attachment 2) note that downstream water quality impacts (e.g., benefits from improved water quality in the Bay) have not been fully and that changes in land price, resulting from water quality programs, are natural market responses and may motivate optimal development conditions (i.e., price increases are not necessarily bad).

Attachment 3 provides the most recent summary of options for addressing the question of social impacts related to growth and development. This summary is in response to requests from the UAA workgroup meeting on July 2, 2002.

Attachment 1. Impacts Associated with Potential Growth Constraints (Miller, 6/25/02)

It has been suggested in the 3/15/02 memo to the UAA workgroup (Use Attainability Analysis Social Impacts) that the social impact analysis should address impacts associated with implicit growth or development constraints in areas serviced by wastewater treatment plants (POTWs). This suggestion is based on expectations of projected growth combined with (1) more stringent caps on nutrient loads from POTWs, (2) rates of abatement technology improvements that are unlikely to be able to keep up with nutrient cap constraints, (3) unwillingness of POTW service areas to "sell" nutrient reduction capacity under potential trading programs, and other considerations.

Potential consequences noted in the memo include (1) decreased availability of land for development in urbanized area as stormwater controls are implemented, (2) increased cost of land in urbanized/POTW service areas in response to decreased availability of land, and (3) subsequent redirection of development to areas outside POTW service areas (increased potential for sprawl and septic system installation).

To put the potential impacts in perspective, communities are assumed to have an optimal or equilibrium level of development, based on expected demand and supply of development. The total net benefits (or surplus) are the area X (see **Exhibit J-1**).

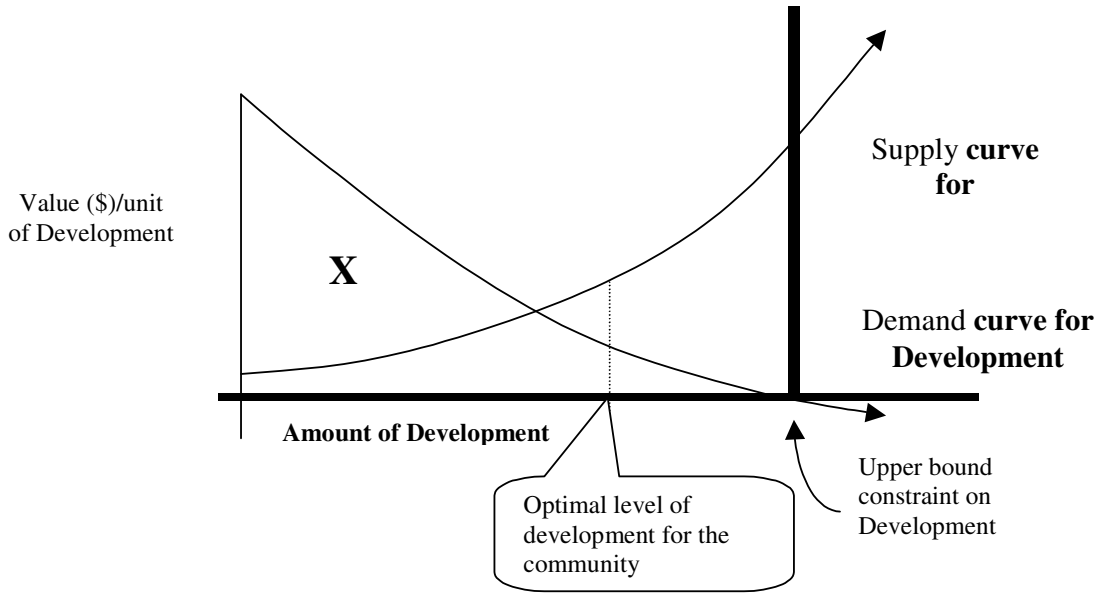

Exhibit J-1: Development Supply and Demand

If nutrient load caps are implemented and urban land prices increase, as suggested in the social impacts memo, then there may be changes in the supply curve - resulting in lower level of development and loss in benefits equal to areas A + B in **Exhibit J-2**.

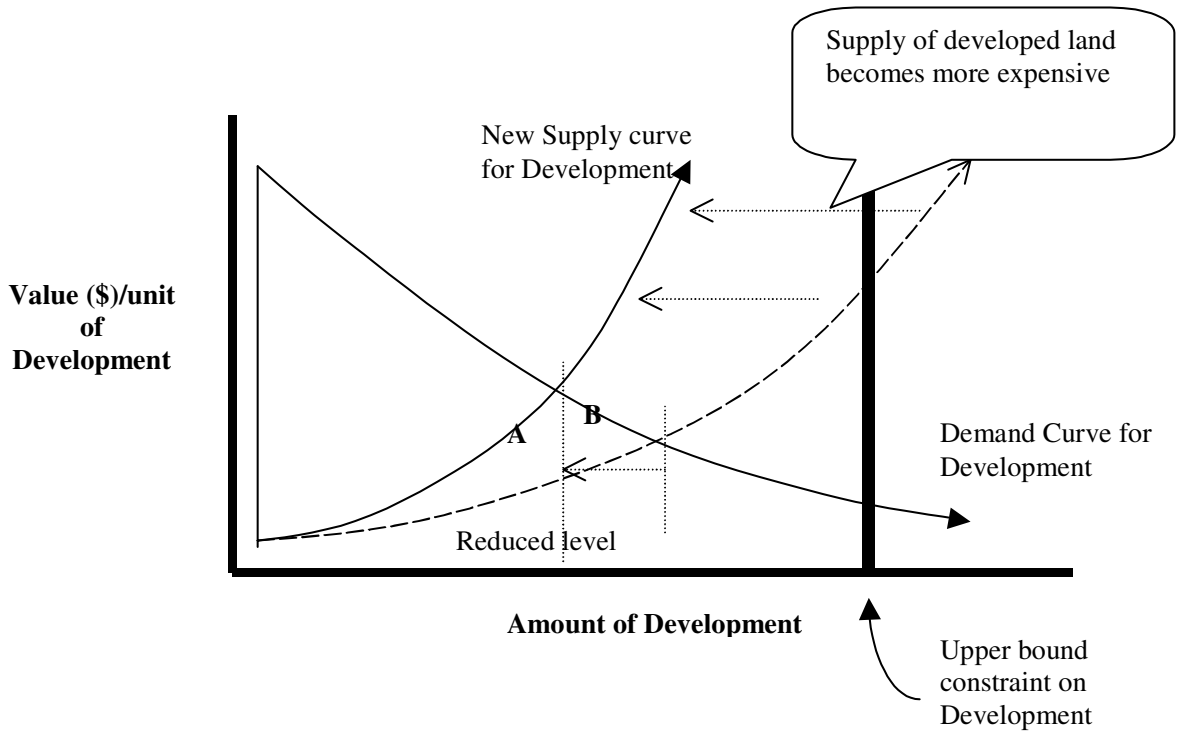

Exhibit J-2: Development Study and Demand Curves – Effects of Urban Land Price Increase

It should be noted that new abatement technology (e.g., advances in limited impact development) and improved growth management strategies (smart growth) may help mitigate adverse shifts in the upper bound constraint and/or supply (i.e., marginal cost) curve for development. As a consequence, the net welfare impacts on the community may be small (or even positive if social costs are accounted for in the supply curve). Regulatory impact assessments for (1) construction effluent guideline and (2) Phase II of the storm water management permitting requirements indicate that direct impacts on the developer sector are relatively small, implying that the potential for increased development costs may be minimal in some areas (i.e., minimal shift in the development supply curve)). However, the memo (3/15/02) suggests that 'growth' potential could be constrained by as much as 40% (i.e., a change from 5 to 3 mg N /l effluent goals is a 40% drop), implying the potential for greater impacts than those assessed in recent regulatory impacts..

Alternatively, a nutrient cap may cause a shift in the upper bound development constraint such that it shifts so far to the left that it limits optimal development, creating loss in net benefits equal to area A in **Exhibit J-3**.

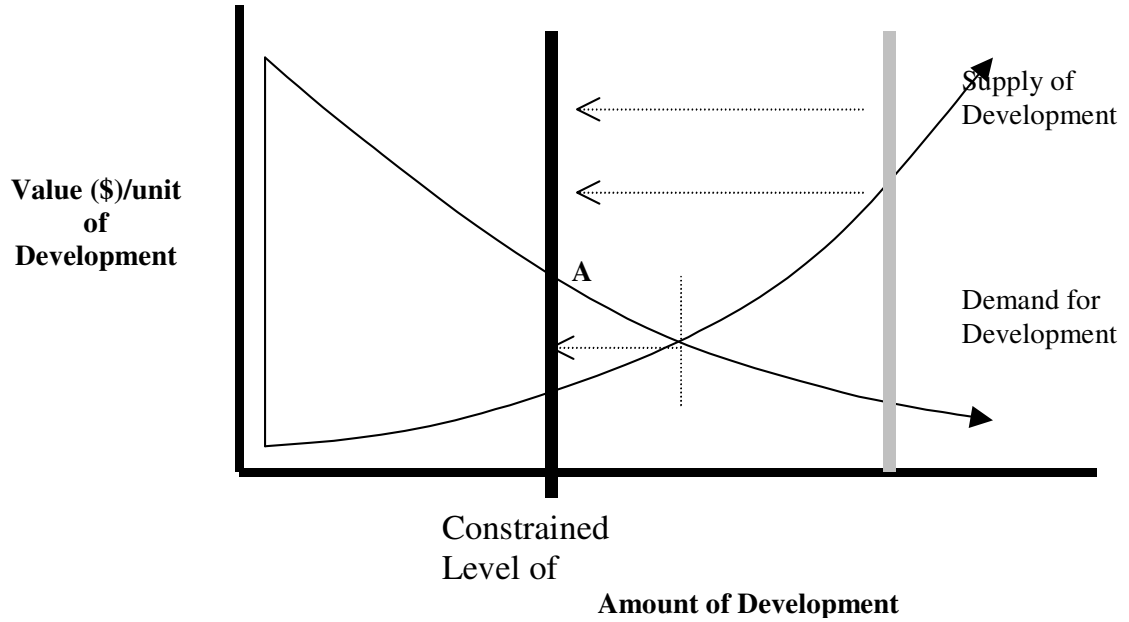

**Exhibit J-3: Development Supply and Demand Curves –
Effect of Upper Bound Constraint**

It should also be noted that there could be adverse welfare impacts associated with projected growth and development that have not been addressed. Recent surveys indicate that many voters in the Chesapeake Bay watershed are concerned about current rates of sprawl and growth and feel that quality of life will decrease if current trends continue. If environmental and other perceived social costs associated with development are accounted for, then the supply curve will shift up, implying that the optimal level of development in the community should be lower to reduce 'damages' associated with development (see exhibit below). In some communities, it has been shown that development undervalues the need for infrastructure to support expanding communities, resulting in congestion, etc. An increase in congestion may decrease demand, thereby lowering the desire for new development.

In **Exhibit J-4**, the new optimal level of development avoids the damages (area A) caused by excess development and growth. Implicit growth constraints associated with caps may therefore be a mechanism for encouraging socially optimal levels of development in some areas.

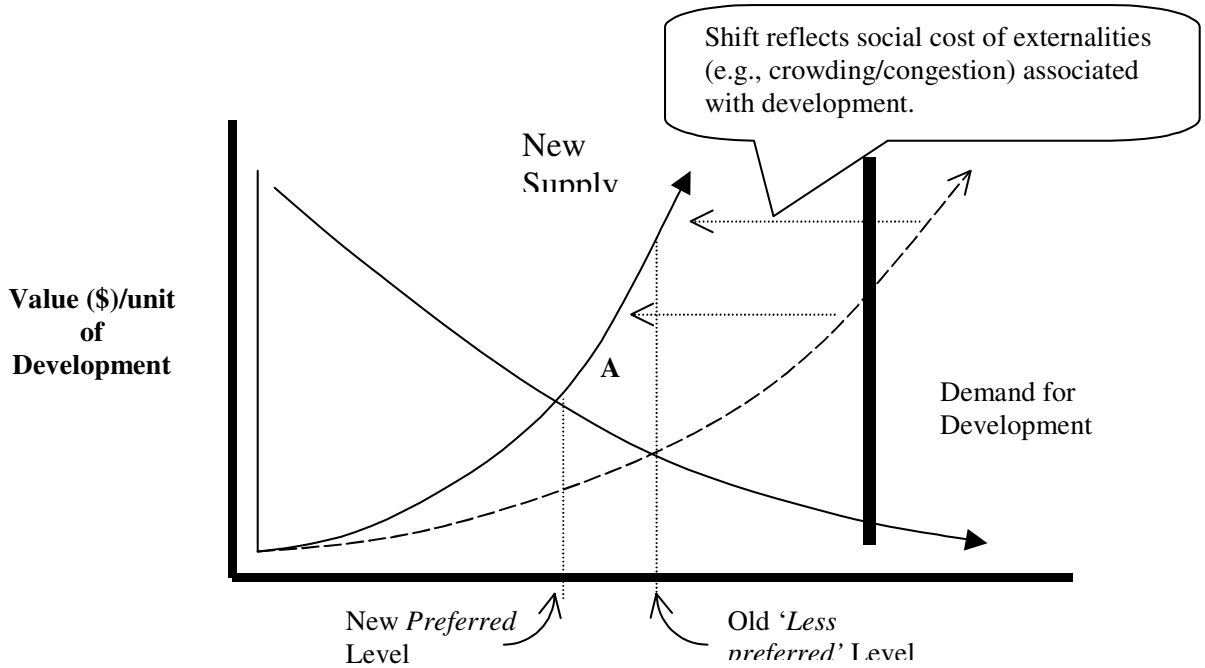

Exhibit J-4: Development of Supply and Demand Curves – Effect of Implicit Growth Constraints

Given the numerous factors affecting optimal levels of development, it is difficult to make preliminary conclusions about the impacts of implicit growth constraints associated with nutrient caps. If there is still a desire to address growth in the economic impact analysis for the Bay, a possible approach is to define criteria for identifying one or more counties/municipalities where nutrient load caps are likely to cause an adverse shift in supply or upper bound constraints. The criteria could then be used to select "hot" counties and try to determine if shifts are likely to create significant adverse impacts in those counties. Candidate criteria are (1) current treatment volume versus design capacity for POTW, (2) Maryland smart growth target communities, (3) Population density, (4) projected growth estimates, (5) assessed property value (per acre?), and (6) percent of land not developed, (7) development/growth trends, and/or (7) personal knowledge.

Attachment 2. Comments on Impacts Associated with Potential Growth Constraints (Miller, 6/25/02)

This essay provides a good starting place for economic consideration of water-quality impacts of development and the regulations that might mitigate these. But it seems to me that one could make a stronger argument for graphs one and two being merely background for the fourth graph. The third graph models impacts of getting the regulation wrong.

When considering the supply of and demand for land for residential and commercial development, it is necessary to take into account the full range of costs) incurred by development. Particularly when the discussion takes place around a stressed water-body, one wants to consider both private costs and water quality (social) costs.

Regulations and commercial requirements currently in place make some environmental costs transparent in the marketplace. Sewer hook-up fees and stormwater management are expected development costs and they factor into the supply curve for the graph of the market for development.

However, if there are downstream water-quality impacts that have not been part of the regulatory framework, then these will be missing from the graph and the intersection of the supply and demand curve will overstate the optimal level of development. If one were able to properly assign those costs, whether through regulation or through market-based incentives, the supply curve would pivot up (because more costs are being accounted) and the optimal level of development would shift to the left (would diminish, at any given price). This mirrors your final graph of the market, but without bringing "quality of life" factors into the picture.

It is the fact that there are water quality externalities associated with development that bring this issue to the fore in the first place. If additional impervious surfaces impose costs beyond that of periodic hazard (hasn't the goal of stormwater management been to move water safely away?) and far beyond the other material costs for installing them, and if the developer is not required to pay these costs, then this constitutes a market imperfection and the actual intersection of supply and demand is no longer optimal.

It may be a bit difficult to establish the precise water-quality cost imposed by an additional unit of development; especially if this is being done without attention to the underlying theory. And, if you priced development water-quality impacts too high, you would move the supply curve further than is optimal. But this is a different issue than whether or not imposing water-quality restrictions (costs) on property development moves you toward or away from equilibrium. They will move you toward optimality if you do them right and past it if you get it wrong. It would be better, of course, to let the market set the price, but this seems to be a bridge too far at this point.

With respect to new criteria to establish whether or not growth restrictions will create substantial and widespread economic impacts, it seems to me that you need to determine cost efficiency before you can say that your mix of water-quality regulations are too expensive. You have to

show that you are achieving your reductions in a least-cost manner before you can say that the reductions are too expensive.

Rob Wieland
Main Street Economics

Attachment 3. Options for Addressing Growth and Development Impacts

As indicated in attachment 1, it may be theoretically possible to define an optimal level of development and any deviations from this level could be interpreted as a loss in welfare and a negative impact on society (assuming you have addressed all externalities). However, comprehensive cost benefit analysis is needed to quantify these losses. Current economic analysis by the Chesapeake Bay UAA workgroup has focused on impact analysis, and, in particular, on cost impacts (i.e., who pays); time and resource constraints may limit our ability to perform cost benefit analysis as it relates to changes in development and growth patterns.

If we assume that cost impacts continue to be the current focus of the UAA workgroup, then we can ask what are the potential costs of displaced growth and development. The primary cost may be increased or unexpected infrastructure costs (transportation, services) associated with displaced development in areas that were not prepared to handle new development. These costs may ultimately be paid by residents/landowners, and net costs will result only if infrastructure costs under new regulations exceed expected infrastructure costs under baseline regulatory conditions. This type of analysis would benefit from policy simulations that can predict development patterns for the watershed before and after regulation; a study by Bockstael (1996) demonstrates such a simulation.

Bockstael (1996) developed a spatial model to predict development (conversion of agriculture land to residential use) for policy analysis and applied the model to the Patuxent watershed. The model estimates the probability that segments of land will be converted based on the assumption that development occurs only if the net returns (returns-cost) of development exceed that of retaining the original land use (i.e., agriculture). The price of residential land is used as a proxy for returns, and Bockstael estimates price as a function of (using 1990 data for real estate transactions in seven counties within the Patuxent watershed):

- Distance to highway
- Distance to commercial/urban centers (e.g., Baltimore)
- Waterfront property
- Distance to public transportation (e.g., bus)
- Percent of surrounding land that is forest, agriculture, or low-density zoned, and
- Quality of public services (represented by dummy variables for counties)

The probability of land use conversion for any given cell within the Patuxent watershed is then estimated to be a function of (using development decisions on buildable parcels within the Patuxent watershed from 1990 to 1994):

- Residential land price (as estimated above)
- Factors affecting cost of development (slope, soils, clearing needed)
- Expected returns from agriculture (represented by price of agriculture land), and
- Existing sewer access.

This probability model was used to determine development patterns under different sewer extension scenarios in the Patuxent watershed.

The immediate applicability of Bockstael's model is limited in the case of the Chesapeake Bay UAA due to the need to re-estimate the model to (1) include all basins in the Bay watershed, and (2) include other policy variables (not just sewers) relevant to growth constraints and nutrient caps (e.g., decreased supply of land and increased land prices in urban areas; conversion of urban residential areas, as opposed to simple conversion of agriculture land). Recall as well, that infrastructure costs would still have to be estimated and compared under different development pattern outcomes to determine potential cost impacts. Time or resources may again limit the ability of the UAA workgroup to accomplish this level of modeling in the immediate future.

In contrast to comprehensive development simulations, an option is to adopt screening level indicators to identify counties where social impacts from growth or development displacement are potentially significant (and widespread). Screening level indicators, based in part on descriptive variables adopted by Bockstael, may provide opportunity to identify counties with:

- Greater potential for development
  - Population density, # single family homes per area unit
  - Percent of homes within walking distance to commercial areas
  - Percent of homes within walking distance to transit station
  - Distance to commercial centers (e.g., Baltimore)
  - Distance to highway
  - Other variables used by Bockstael to predict residential price
  - Previously estimated growth predictions
- Limited or lower levels of current infrastructure
  - Ratio of current treatment volume to design capacity for POTW
  - Transportation congestion indices (e.g., GIS based measures such as road link/road nodes; % of single family homes within walking distance to transit stops)
  - County expenditures on services per acre or per capita
- Limited or less capacity to offset urban nutrient load reductions
  - Nutrient reductions possible from agriculture
  - Relative cost-effectiveness of agricultural nutrient reductions

The combined score of screening level impact indicators may suggest the need to explore other policy options or nutrient reduction scenarios to alleviate potential social impacts in some urban areas. Additional candidates for indicators are likely to be found in other spatial studies/models of land use conversion (e.g., World Bank Studies).

Attachment 4. Use Attainability Analysis Social Impacts

(preliminary draft for UAAWG discussion, 3/15/02, provided by Tanya Spano, Metropolitan Washington Council of Governments)

This document attempts to outline a range of potential social impacts that need to be evaluated and considered during the Bay-wide and ultimately the state-specific Use Attainability Analysis (UAA). This effort is focused on describing the potential impacts of implementing the various tiers under the resultant 'capped' nutrient and sediment loads. It currently focuses on potential urban/suburban impacts. This outline does not presume to define an absolute future, but rather a spectrum of potential impacts and to indicate where those impacts are most likely to be manifested.

Working Assumptions:

1. Growth (e.g., human and animal populations) in the Bay basin are expected to increase up to and after the year 2010;
2. The projected growth will occur in the basin, therefore the impacts to be considered must consider how this growth will potentially be redirected or relocated;
3. Demands for wastewater treatment will increase in response to that growth;
4. Controls matching or similar to those outlined in the current tier descriptions will actually be implemented;
5. Controls on loads that already have regulatory programs and/or requirements are most likely to be implemented first (i.e., wastewater plants and urban stormwater);
6. Controls on less regulated loads (i.e., on-site/septic systems) will continue to have fewer controls and therefore be less restrictive in response to cap loads;
7. Therefore, wastewater treatment plants (wwtps) will likely have cap loads assigned to them, while other sectors are less likely to have specific assigned cap loads;
8. Controls for addressing nitrogen loads will normally have the most significant impact on wastewater plants (i.e., be the controlling factor);
9. Given the description of the current tiers, the most significant and widespread social impacts are not likely to manifest themselves until/unless Tier 3 or Tier 4 controls are implemented (i.e., TN = 5 mg/l and TN = 3 mg/l respectively);
10. The ability to reduce TN from 5 to 3 mg/l represents a 'growth potential' of approximately 40%;
11. A WWTP that has the capability to make such reductions in TN will have growth capacity, and the jurisdiction/entity that owns that facility will therefore own that growth potential;
12. Refinements to wastewater and stormwater treatment technologies will likely occur, but major innovations are not likely to occur within the current planning horizon (i.e., year 2010) such that significant increases in loads can be accommodated;
13. Therefore, a jurisdiction's planning horizon may be constrained by the limits imposed by the 40% growth potential;
14. As control levels increase, new development or redevelopment would first have to address any potential limits on wastewater capacity that limit such development;

15. Increased stormwater controls would increase demand and cost for land at same time that wastewater treatment costs and capacity constraints were increasing;
16. Increased controls on air sources will continue to be driven primarily by CAA demands; and
17. Growth potential has generally resulted in and is often viewed as supporting a jurisdiction's economic viability even given its associated costs and impacts - therefore, the ability or inability to support growth will continue to be viewed primarily as a matter of economics.

Scenario #1 – Tier 3 Implemented (i.e., What happens at 5 mg/l TN?)

1. If a jurisdiction has WWTP 'growth potential' (i.e., has a load allocation, can employ the necessary technology, and does not have local water quality constraints/TMDLs):
   - Jurisdictions will have ability to support up to about a 40% increase in growth through the addition of new technology and the associated costs.
   - Growth in those jurisdictions would presumably occur in relatively developed urban/suburban areas.

2. If a jurisdiction does not have wwtp 'growth potential' (i.e., at or reaches its cap load, has local water quality constraints/TMDLs, can't implement the necessary technology, or if a new wwtp without a load allocation):
   - Must trade or allow increased use of on-site/septic systems or limit development.
   - Need for a trade makes wastewater treatment capacity an economic commodity.
   - Increased use of septic systems would presumably be linked with less dense development (i.e., increased sprawl).
   - Limits on development in face of increased wastewater demand will increase costs in basins where limited capacity already exits, and divert growth to other basins where greater capacity exists.

3. If a jurisdiction must address its 'growth potential' exclusively through use of on-site septic systems (i.e., has the land to devote to expanded use of these systems):
   - Increased demand for land/acreage (i.e., sprawl) to expand use of on-site systems.
   - Need to trade with other jurisdictions for wastewater capacity.

Scenario #2 – Tier 4 Implemented (i.e., What happens at 3 mg/l TN?)

1. Once a jurisdiction has reached its load allocation or limit (i.e., it has implemented the necessary technology, it cannot reduce its loads through the use of technology, or it is limited due to local water quality constraints/TMDLs):
   - Trades may occur if price is acceptable and if no local water quality constraints.
   - Growth will be forced outside of the basin to other areas where capacity exists.
   - Increased demands for development in watersheds outside of Bay restrictions.
   - Increased demands and use of on-site/septic systems where available.

2. For those jurisdictions that rely upon on-site/septic systems:
   - Increased demand to expand use of those systems.
   - Increased expansion of land utilizing those systems (i.e., sprawl).

Social Impacts - What occurs at Tier 3 is expanded dramatically at Tier 4

Land Use

- Increased demand for urban land due either to: a) ability to support additional growth, or b) in response to diminishing supply as existing capacity is used up.
- Increased demand for urban land to support stormwater controls.
- Increased demand for suburban/rural land for on-site/septic systems.
- Increased cost for those lands.
- Increased demand for and need for infrastructure to support growth in suburban/rural lands.
- Net impact of these demands, in face of increased growth, will be to increase pressure to develop on lands with fewer controls and significantly increase costs for areas with higher levels of controls.
- As control levels increase to technology limits (i.e., TN of 3 mg/l vs. TN of 5 mg/l), loss of Smart Growth incentives occurs because:
  - Nothing left to trade.
  - Cannot increase density in developed areas because sewer connections are limited.
  - Significant stormwater retrofits also become more impractical because of limited availability of lands.
  - May result in increased development demands and land use impacts into expanded suburban/rural areas and those areas outside Bay watershed in response to Bay constraints.

Growth Potential

- Those jurisdictions that have growth potential may be reluctant to sell the capacity as this would limit their future growth opportunities.
- Only very high economic incentives will encourage this growth potential to be traded.
- If this capacity is available to purchase it will involve transfer of wealth from the growing areas to the older areas.
- Areas where growth potential actually exists may conflict with either Smart Growth policies and/or local water quality constraints/TMDLs.

Societal Impacts

- Displacement and separation of the extended family as controls increase—If new homes can not be built the next generation will not be able to live close to their original families.
- Gentrification of the remaining population—As the next generation moves away, the remaining population will age, and as these people retire, there will be a lesser population to provide a work force.
- As controls increase to level of technology levels, housing costs will increase due to the increased cost of controls in addition to the increased demand and limited supply of wastewater treatment capacity—which will tend to negatively impact and displace poorer socio-economic sectors.

Environmental Impacts

- A decrease in impacts and improved local water quality would result - to the extent that Bay-related controls address local water quality issues.
- In face of increased growth and as jurisdictions reached limit of technology control levels, increased controls in Bay watershed may result in the displacement of pollution to other less controlled areas.
- Pressures to increase use of septic (due to fewer controls) and decreased availability for wastewater treatment capacity could result in 'advanced' sprawl (i.e., into lands outside Bay watershed and expanded suburban/rural lands) and the resultant increase in infrastructure/air/transportation demands and impacts.

Economic Impacts

- Expect increase in controls would increase demand for environmentally-related jobs and business sectors, however such benefits may be limited to specific socio-economic sectors of society.
- As development potential decreases within a basin, construction related jobs and industries would also decrease which would have a more significant impact on specific socio-economic sectors of society.
- As increased levels of control impact and potentially limit development, jurisdictions will need to determine the economic impact of these changes to their tax revenue and economic well-being—some jurisdictions may be negatively impacted, some may benefit.
- These changes will require an analysis of what constitutes a healthy economy, can such an economy be supported without continued growth, which social and economic sectors are harmed or benefit from such changes, and what are the appropriate responses from the jurisdictions to such changes.

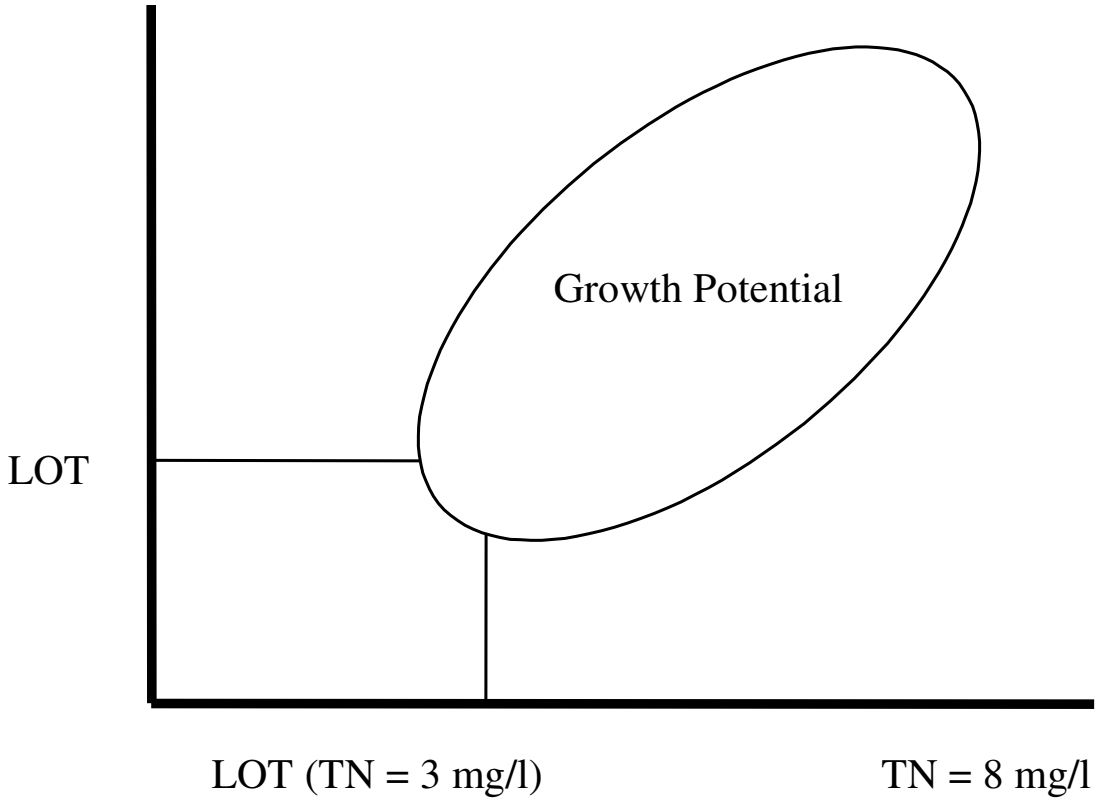

Exhibit J-5: Growth Potential –
Determination of Jurisdiction's Current and Future Options